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Quality of Western Canadian Wheat 1992

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Quality of Western Canadian Wheat 1992

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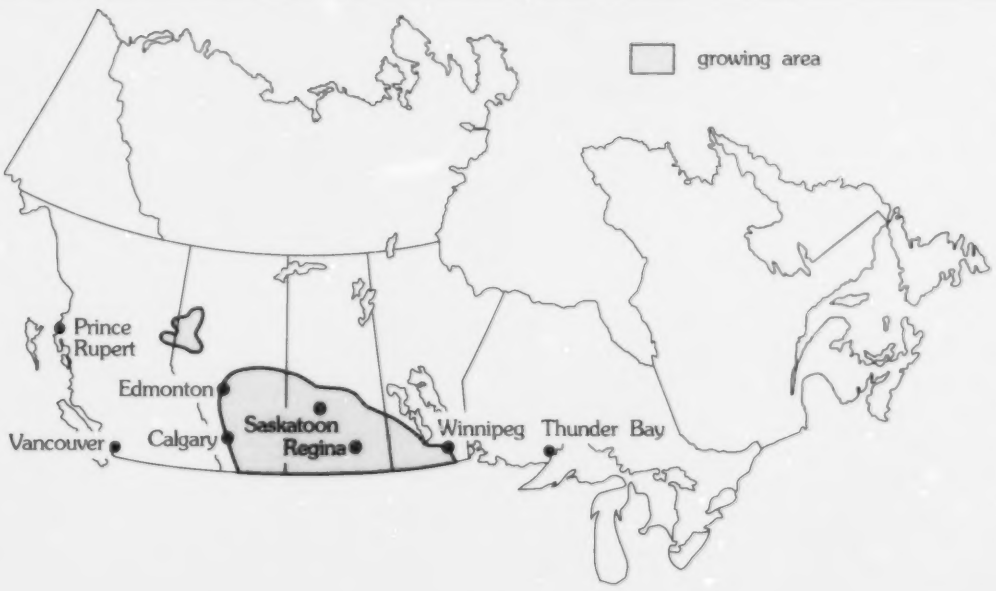
Figure 1. Map of Canada Showing Major Wheat Producing Areas in the Prairies



Summary

Despite adverse growing and harvest conditions, the Canadian grading system successfully protects the top grades and maintains their intrinsic quality. This is underlined by the excellent milling and baking quality of 1992 CWRS wheat. Top grade amber durum wheat produces pasta with excellent color and good cooking quality.

The harvest was damaged by widespread frosts in late August. This followed an unseasonably cool summer during which crop development in Western Canada was delayed. As a result, a record low proportion of the wheat crop is expected to qualify for the top grades. As well, abundant moisture during the growing season contributed to the lowest average protein content (12.6%) for red spring wheat since 1956.

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Introduction

This bulletin presents detailed information on the quality of the 1992 crop of six classes of Canadian wheat offered on the world market:

Canada Western Red Spring Wheat: a hard wheat with superior milling and baking quality. It is offered at various guaranteed levels of protein content.

Canada Western Amber Durum Wheat: a durum wheat producing a high yield of semolina with excellent pasta-making quality.

Canada Western Red Winter Wheat: a hard wheat suitable for the production of a wide variety of products including French breads, flat breads, steamed breads and certain types of noodles.

Canada Prairie Spring Wheat: a semi-hard wheat with excellent milling quality, medium protein content and medium gluten strength. It is suitable for use in the production of hearth and flat breads, crackers, noodles and chapattis.

Canada Western Utility Wheat: a hard red spring wheat with extra-strong gluten suitable for blending purposes and for the production of hearth and pan breads.

Canada Western Soft White Spring Wheat: a soft wheat of medium-to-low protein content for production of various types of flat breads, noodles, steamed breads, chapattis, cookies, cakes and pastry.

It is important to note that data presented in this bulletin are not quality specifications for Canadian wheat. Rather, they represent our best estimate of quality.

The extent to which the data in this bulletin indicate the exact quality characteristics of wheat of any given grade that will be exported during the coming year depends on a number of factors. These include: the amounts and relative quality of carryover stocks of each grade, and whether the harvest survey composites are, indeed, truly representative of the harvest production.

Statistics Canada (*Field Crop Reporting Series*, No. 7, October 7, 1992) estimates 1992 production of red spring wheat in Western Canada at 21.5 million tonnes (from 11.4 million seeded hectares), compared with 25.7 million tonnes (from 12.0 million hectares) in 1991 and the ten-year (1981-90) average of 20.7 million tonnes (from 10.9 million hectares). Total production of other spring wheat classes (mainly Canada Western Utility, Canada Western Soft White Spring and Canada Prairie Spring) is 2.6 million tonnes.

Corresponding production estimates for durum wheat are as follows: 3.0 million tonnes (from 1.5 million hectares) for 1992, a record 4.5 million tonnes (from 2.0 million hectares) for 1991 and 3.1 million tonnes (from 1.9 million hectares) for the 10-year average (1981-90).

Production of red winter wheat is estimated this year to be 94 thousand tonnes (from 55 thousand hectares) - down substantially from last year's production of 180 thousand tonnes (from 77 thousand hectares). This is very much below the 10-year average production of 458 thousand tonnes (from 256 thousand hectares) for this class of wheat.

The warm, dry autumn of 1991 left most areas of the Prairies short of topsoil moisture for the 1992 spring season. The exception was the Red River valley of Manitoba which had flooding problems early in the spring. May rainfall throughout most of the grain belt improved the moisture situation for seeding. Southern Alberta and southwestern Saskatchewan, however, suffered poor topsoil moisture conditions until June when rain improved the crop conditions and spurred heavy second growth. At the same time, persistent drought in the Peace River region, northern Alberta and northern Saskatchewan caused uneven growth and crop development. Yield potential was sharply reduced in these areas as a result of moisture stress. Northern Alberta and northern Saskatchewan received late July precipitation which improved crop conditions but caused another wave of second growth. The central Prairies from Alberta through Manitoba experienced an excellent growing season with substantial amounts of moisture and low heat stress.

Because of the effects of the cool growing season, crop development was lagging much behind normal by July. Individual fields varied markedly in terms of crop stage, but generally crops were a week behind normal in Alberta and up to three weeks behind normal in Manitoba. The cool temperatures kept moisture stress to a minimum but continued to delay crop growth. By August, it was apparent that frost-free conditions were needed until early September in order to avoid damage to the wheat.

On August 21, the season's first major frost was reported in northern Saskatchewan, and freezing temperatures occurred frequently over the next few days. By September 1, Alberta, Saskatchewan and northwestern Manitoba had all experienced at least one but in most cases repeated frost attacks on unripened grain. In addition, two heavy snowfalls in Alberta caused lodging over an extensive area. As a result of these factors, a record low proportion of the wheat is expected to enter the top milling grades. The Grain Inspection Division of the Canadian Grain Commission estimates that only 21% of the red spring wheat harvest will qualify for grades No. 1 and 2 Canada Western Red Spring (CWRS), with the balance entering the grades 3 CWRS and Canada Western Feed. Put into perspective, this compares with an estimate of 92% No. 1 plus No. 2 CWRS for the 1991 crop and an average of 68% (range 42-91%) for the previous 20-year period (going back to 1971 when the CWRS grades were introduced). It is interesting to note that widespread frost damage occurs about every 10 years in Western Canada, with previous "milestone" years being 1982, 1974 and 1964. A similar low-grade pattern exists for amber durum wheat.

In late September, two weeks of mainly dry and quite warm weather led to rapid harvest progress. By October 12, cool and snowy conditions had stalled operations, with the likelihood that unharvested grain will remain in the fields until next spring. Approximately 95% of the crop was in the bins by this time. The very late harvest caused a considerable delay in publication of this year's wheat quality bulletin.

Data from the 1992 protein content survey and from tests on grade composite samples of six classes of wheat are presented in the series of tables, figures and comments which now follow. Table 1 gives mean protein content values for wheat of each class reported. Details regardng the collection of samples and methods used to obtain the data are provided at the end of this bulletin.

Figure 1 (page 2) shows the general wheat growing areas in Western Canada.

1. Protein Content of 1992 and 1991 Crop Canada Western (CW) and Canada Prairie Spring Wheat Classes

Wheat Class	Protein Content*	
	1992	1991
	%	%
CW Red Spring	12.6	13.4
CW Amber Durum	12.1	12.4
CW Red Winter	11.0	10.6
Canada Prairie Spring	10.5	11.3
CW Utility	11.8	12.9
CW Soft White Spring	10.6	10.6

* mean value, N x 5.7; 13.5% moisture content basis.

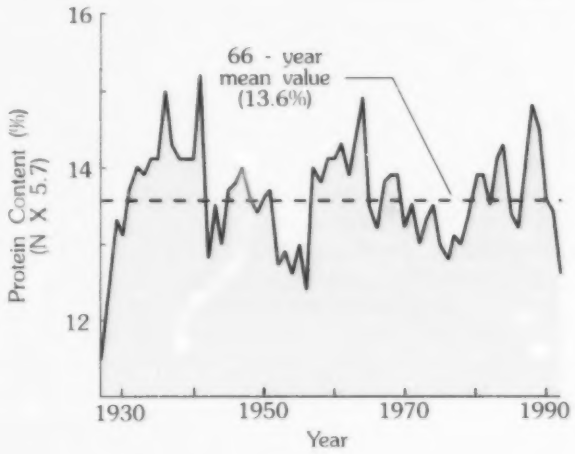
Canada Western Red Spring Wheat

Protein Survey

The average protein content of the 1992 red spring wheat crop is 12.6% - down 0.8 percentage units from last year. This estimate, one percentage unit lower than the long-term average, is based on 12 833 harvest survey samples tested this year.

The mean protein of both the No. 1 CW samples (12.9%) and No. 2 CW samples (12.6%) is 1.2 percentage units lower than the corresponding ten-year average indicated in Table 2. Annual fluctuation in mean protein content since 1927 is shown in Figure 2. This year's average is the lowest since 1956.

Figure 2. Mean Protein Content of Harvest Survey Western Canadian Red Spring Wheat 1927 to 1992



2. Protein Content of 1992 Harvest Survey Red Spring Wheat

	Protein Content (%)*					
	Western Canada			1992		
Grade	1992	1991	1982-91	Manitoba	Saskatchewan	Alberta
No. 1 CWRS	12.9	13.4	14.1	13.0	12.8	13.7
No. 2 CWRS	12.6	13.3	13.8	12.7	12.5	13.1
No. 3 CWRS	12.5	13.1	13.4	12.4	12.4	13.0
All Milling Grades	12.6	13.4	13.9	12.7	12.5	13.2

* N x 5.7; 13.5% moisture content basis.

Milling and Baking Quality • Allis-Chalmers Laboratory Mill

For quality assessment of the 1992 Canada Western Red Spring (CWRS) wheat crop, composites were prepared from almost 13,000 harvest survey samples representing the three milling grades. The No. 1 and No. 2 CW grades were segregated into composite samples with minimum levels of protein content of 13.5 and 12.5%.

No. 1 Canada Western Red Spring Wheat

Quality data for the No. 1 CWRS composites are given in Table 3. Corresponding data are provided for last year's composites, as well as 10-year (1981-90) averages for the No. 1 CW 13.5 segregate. Since single composites are now being used, the comparative 10-year average data represent averages of the Eastern and Western Prairie No. 1 CW quality data reported in harvest survey bulletins prior to 1991.

Test weight is similar to last year, while kernel weight is higher. All composites show low levels of alpha-amylase activity and correspondingly high values for wheat falling number and flour amylograph peak viscosity. Wheat ash content is considerably lower than both 1991 and long-term average values. The higher particle size index and lower flour starch damage values indicate softer wheat texture this year.

Milling quality is superior to last year, with higher flour yield and lower ash content. Pilot milling information is presented on pages 11 and 12.

Farinograph absorption is similar to 1991 and somewhat higher than long-term average values. Farinogram and extensigram characteristics of this year's samples indicate stronger dough properties than in previous years.

Baking results for this year's No. 1 grade show high loaf volume per unit of flour protein and very good crumb and crust characteristics in the Remix-to-peak method. Baking absorptions are similar to 1991. Additional baking quality information is presented on pages 11 and 12.

No. 2 Canada Western Red Spring Wheat

Quality characteristics for the No. 2 CWRS composites by protein segregate level, representing the overall prairie region, are shown in Table 4. Corresponding 1991 and 10-year average data (averages of Eastern and Western Prairie data previously reported) are also given.

Test weight and 1000 kernel weight are higher than 1991 values. Wheat ash content is much lower than last year. Wheat falling number and flour amylograph peak viscosity values are high, indicating sound kernel characteristics. Milling properties show the same trend as the No. 1 grade - superior flour yield, flour ash content and flour color.

Physical dough properties are stronger than in previous years. Farinograph absorption is somewhat higher than both last year's and long-term average values for the 13.5% protein segregate.

Baking results (Remix-to-peak method) are very good - with baking properties of the 1992 composites within the range normally expected for this grade.

No. 3 Canada Western Red Spring Wheat

Quality data for this composite are provided in Table 5. Comparisons with previous years are not available.

This year's No. 3 CWRS wheat compares favourably in overall quality with the top grades and confirms the ability of the Canadian grading system to successfully separate into the Canada Western Feed grade wheat whose milling and baking quality has been seriously impaired by weathering.

Compared with No. 2 CWRS wheat at the same (12.5%) protein content, the 1992 composite sample of No. 3 CWRS, while still sound, has higher alpha-amylase activity (lower wheat falling number). The wheat is slightly harder and produces a lower yield of flour with a higher level of starch damage. Physical dough characteristics are a little weaker. Baking quality is good although loaf volume per unit protein is lower than for the top two grades.

3. NO. 1 CANADA WESTERN RED SPRING WHEAT
Quality Data for 1992 Harvest Survey Grade Composite Samples

Quality Parameter	Minimum Protein Level		No. 1 CW 13.5	
	13.5	12.5	1991	Mean*
WHEAT				
Test Weight, kg/hL	80.8	81.1	80.8	81.2
Weight per 1000 Kernels, g	32.7	32.9	30.9	30.2
Protein Content, % (13.5% moisture basis)	13.7	12.8	13.8	13.8
Protein Content, % (dry matter basis)	15.8	14.8	16.0	16.0
Ash Content, %	1.43	1.52	1.61	1.56
Alpha-amylase Activity, units/g	3.0	5.0	4.4	3.8
Falling Number, s	410	410	400	405
Particle Size Index, %	50.3	49.0	48.1	N/A
MILLING				
Flour Yield				
Clean Wheat Basis, %	76.4	76.6	75.4	75.4
0.50% Ash Basis, %	77.9	78.1	75.4	76.4
FLOUR				
Protein Content, %	13.3	12.2	13.1	13.2
Wet Gluten Content, %	39.9	35.2	39.2	39.3
Ash Content, %	0.47	0.47	0.50	0.48
Grade Color, K-J units	-1.5	-1.7	-1.1	-0.8
AGTRON Color, %	72	72	N/A	N/A
Starch Damage, Farrand units	30	34	36	32
Starch Damage, AACC units	8.8	9.6	N/A	N/A
Alpha-amylase Activity, units/g	1.5	1.0	1.4	1.0
Amylograph Peak Viscosity, BU	660	685	700	725
Maltose Value, g/100 g	2.2	2.2	2.3	2.0
FARINOGRAM				
Absorption, %	65.6	65.3	65.6	64.9
Development Time, min	5.50	4.75	4.75	4.50
Mixing Tolerance Index, BU	20	25	25	30
Stability, min	12.00	11.00	11.00	8.25
EXTENSIGRAM				
Length, cm	22	21	22	22
Height at 5 cm, BU	310	315	295	265
Maximum Height, BU	535	510	495	430
Area, cm^2	155	145	145	130
ALVEOGRAM				
Length, mm	124	108	119	126
P (height x 1.1), mm	101	117	106	97
W, x 10^3 ergs	425	425	399	394
BAKING (Remix-to-Peak Method)				
Absorption, %	65	63	64	64
Remix Time, min	2.6	2.5	2.6	N/A
Loaf Volume, cm^3	870	810	855	875

* 10-yr period 1981 to 1990, except Maltose Value (8-yr mean) and Mixing Tolerance Index and Stability (6-yr means)

4. NO. 2 CANADA WESTERN RED SPRING WHEAT
Quality Data for 1992 Harvest Survey Grade Composite Samples

Quality Parameter	Minimum Protein Level		No. 2 CW 13.5	
	13.5	12.5	1991	Mean*
WHEAT				
Test Weight, kg/hL	80.1	80.5	78.8	79.7
Weight per 1000 Kernels, g	33.4	33.6	30.3	30.8
Protein Content, % (13.5% moisture basis)	13.6	12.6	13.6	13.7
Protein Content, % (dry matter basis)	15.7	14.6	15.7	15.8
Ash Content, %	1.50	1.47	1.71	1.59
Alpha-amylase Activity, units/g	12.0	7.5	6.6	7.3
Falling Number, s	355	380	385	385
Particle Size Index, %	50.2	49.2	49.5	N/A
MILLING				
Flour Yield				
Clean Wheat Basis, %	75.7	76.2	75.2	75.1
0.50% Ash Basis, %	77.7	78.2	75.2	75.6
FLOUR				
Protein Content, %	13.1	12.0	13.0	13.2
Wet Gluten Content, %	38.0	34.5	38.5	39.0
Ash Content, %	0.46	0.46	0.50	0.49
Grade Color, K-J units	-1.2	-1.5	-0.8	-0.6
AGTRON Color, %	71	72	N/A	N/A
Starch Damage, Farrand units	30	31	33	30
Starch Damage, AACC units	9.4	9.8	N/A	N/A
Alpha-amylase Activity, units/g	4.0	3.0	1.7	2.5
Amylograph Peak Viscosity, BU	490	500	630	580
Maltose Value, g/100 g	2.1	2.2	2.1	2.1
FARINOGRAM				
Absorption, %	65.2	64.1	64.7	64.6
Development Time, min	5.75	4.50	4.75	4.50
Mixing Tolerance Index, BU	20	25	30	35
Stability, min	12.50	10.50	9.75	7.50
EXTENSIGRAM				
Length, cm	21	20	22	22
Height at 5 cm, BU	320	320	290	255
Maximum Height, BU	550	525	495	410
Area, cm^2	155	140	150	125
ALVEOGRAM				
Length, mm	122	105	130	125
P (height x 1.1), mm	105	112	91	93
W, x 10^3 ergs	424	398	381	371
BAKING (Remix-to-Peak Method)				
Absorption, %	64	63	64	64
Remix Time, min	2.4	2.5	2.5	N/A
Loaf Volume, cm^3	870	805	860	870

* 10-yr period 1981 to 1990, except Maltose Value (8-yr mean) and Mixing Tolerance Index and Stability (6-yr means)

5. NO. 3 CANADA WESTERN RED SPRING WHEAT
Quality Data for 1992 Harvest Survey Grade Composite Sample

Quality Parameter	No. 3 CW
WHEAT	
Test Weight, kg/hL	79.6
Weight per 1000 Kernels, g	33.6
Protein Content, % (13.5% moisture basis)	12.5
Protein Content, % (dry matter basis)	14.5
Ash Content, %	1.44
Alpha-amylase Activity, units/g	17.5
Falling Number, s	320
Particle Size Index, %	47.4
MILLING	
Flour Yield	
Clean Wheat Basis, %	74.8
0.50% Ash Basis, %	76.3
FLOUR	
Protein Content, %	11.8
Wet Gluten Content, %	34.0
Ash Content, %	0.47
Grade Color, K-J units	-0.8
AGTRON Color, %	67
Starch Damage, Farrand units	38
Starch Damage, AACC units	10.4
Alpha-amylase Activity, units/g	7.5
Amylograph Peak Viscosity, BU	300
Maltose Value, g/100 g	2.7
FARINOGRAM	
Absorption, %	65.5
Development Time, min	3.50
Mixing Tolerance Index, BU	25
Stability, min	9.50
EXTENSIGRAM	
Length, cm	20
Height at 5 cm, BU	300
Maximum Height, BU	475
Area, cm^2	125
ALVEOGRAM	
Length, mm	89
P (height x 1.1), mm	128
W, x 10^3 ergs	398
BAKING (Remix-to-Peak Method)	
Absorption, %	63
Remix Time, min	2.3
Loaf Volume, cm^3	740

Milling and Baking Quality • GRL Pilot Mill

Samples of 1991 and 1992 harvest survey No. 1 CWRS 13.5 wheat were milled with the GRL pilot mill consecutively in duplicate to complement laboratory-scale milling data.

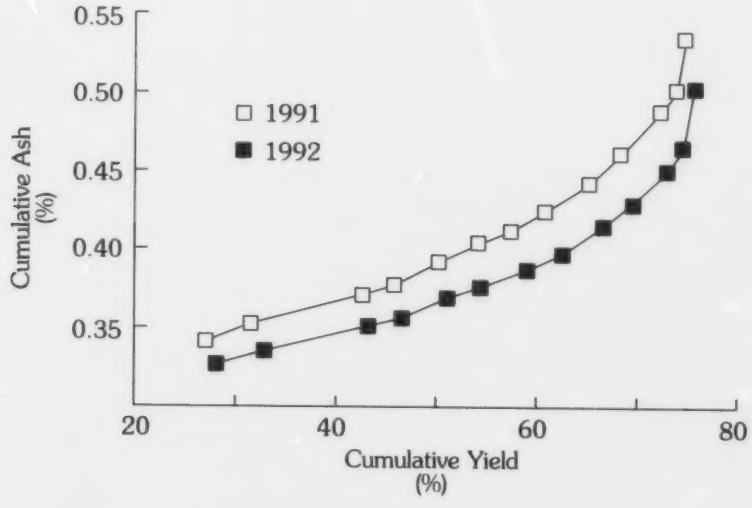
Cumulative ash curves (Figure 3) were computed from the ash content and yield of individual millstreams from each milling. A straight-grade flour and a high quality patent flour (prime quality reduction streams representing 60% of total flour) were prepared to allow comparison of wheat milling properties in a commercially relevant fashion (Table 6). The pilot mill flours were also used to evaluate the baking quality of this year's crop by a 4.5 hr sponge-and-dough procedure and the Canadian short process, a short mechanical development procedure (Table 7).

The pilot milling data are in close agreement with the Allis-Chalmers milling data. When compared with the 1991 composite, the 1992 sample exhibits higher flour yield. Ash content is lower for 1992 at all extraction rates (Figure 3) and flour grade color values are similar for both straight grade and patent flours. Flour starch damage is slightly lower than last year while farinograph absorption is higher. Physical dough tests indicate that dough properties are stronger this year.

Baking results, for 1992 and 1991 samples, are very similar in both the sponge-and-dough method and the Canadian short process. Loaf volume, crumb and crust characteristics, baking absorption and mixing requirements are within the ranges normally expected for this grade and protein level. The oxidation requirement of this year's crop appears similar to that of 1991.

Figure 3. Cumulative Ash Curves for Pilot Mill Flour • 1992 and 1991 Harvest Survey Composites

No. 1 CWRS 13.5



6. NO. 1 CANADA WESTERN 13.5 RED SPRING WHEAT
Pilot Mill Flour Data • 1992 and 1991 Harvest Survey Composites

Quality Parameter	Straight-grade		Patent	
	1992	1991	1992	1991
FLOUR				
Flour Yield, %	75.7	74.9	45.0	45.0
Protein Content, %	13.4	13.3	12.2	12.4
Ash Content, %	0.51	0.53	0.35	0.38
Grade Color, K-J units	-0.2	-0.2	-2.9	-2.7
AGTRON Color, %	63	60	83	81
Amylograph Peak Viscosity, BU	645	775	765	800
Starch Damage, Farrand units	26	28	25	27
Starch Damage, AACC units	8.6	9.0	8.7	9.1
FARINOGRAM				
Absorption, %	64.4	63.6	62.9	62.3
Development Time, min	5.25	5.00	5.75	5.25
Mixing Tolerance Index, BU	25	30	10	20
Stability, min	11.00	9.50	30.00	17.00

7. NO. 1 CANADA WESTERN 13.5 RED SPRING WHEAT
Pilot Mill Flour Baking Data • 1992 and 1991 Harvest Survey Composites

Quality Parameter	Straight-grade		Patent	
	1992	1991	1992	1991
SPONGE-AND-DOUGH METHOD				
Potassium Bromate, ppm	20	20	20	20
Absorption, %	66	66	65	64
Mixing[1]: energy, Whr/kg	3.2	2.8	3.8	3.6
Mixing[1]: time, min	3.9	3.8	5.0	4.8
Loaf Volume, cm^3/100 g flour	1110	1100	1055	1030
Appearance	7.7	7.7	7.8	7.7
Crumb Structure	6.3-o	6.3-o	6.3-o	6.3-o
Crumb Color	8.4	8.2	8.5	8.4
CANADIAN SHORT PROCESS				
Ascorbic Acid/Bromate, ppm	37.5/30	37.5/30	37.5/30	37.5/30
Absorption, %	68	68	67	66
Mixing: energy, Whr/kg	6.2	5.2	5.8	7.0
Mixing: time, min	7.2	6.6	7.6	8.1
Loaf Volume, cm^3/100 g flour	1095	1085	1080	1070
Appearance	7.7	7.7	7.8	8.2
Crumb Structure	6.3-o	6.3-o	6.3-o	6.3-o
Crumb Color	8.1	7.9	8.4	8.5

[1] dough stage

Canada Western Amber Durum Wheat

The 1992 western Canadian durum wheat production of about three million tonnes represents a 34% decrease from the record harvest of 1991. A combination of slow crop growth due to the cool growing season, significant early autumn freezing temperatures across the grain belt and snow in Alberta resulted in substantially lower amounts of durum qualifying for the top two grades this year - with the major degrading factor being frost. Primary factors for downgrading to No. 3 and No. 4 CWAD are "frost" and "green" (immature). Sprouting does not appear to be a major concern.

For the top three grades, test weight is slightly lower and thousand kernel weight values are generally higher than they have been over the past few years. Although the 12.1% average protein content of this year's crop is 0.3 percentage units lower than in 1991 and 1.5 percentage units lower than the 30-year average (Figure 4), protein content for the No.1 and No. 2 grades is comparable to last year (Table 8). As well, vitreous kernel percentage is up slightly from 1991, and SDS sedimentation values are similar. Falling number values are slightly lower than in 1991 and this is reflected by increased alpha-amylase activity. As usual, there is a gradual decrease in falling number with grade.

Semolina yield for the top two grades is down about 1.5 percentage units from 1991 but similar to the yields obtained in 1990. Ash content is significantly lower for both wheat and semolina. Speck count is up in the top grades but semolina color, as indicated by AGTRON values, is comparable. Wheat and semolina yellow pigment levels above 8 ppm and 7 ppm respectively for all four grades are sufficient to allow pasta with a desirable bright, yellow color to be produced. Spaghetti color is excellent for the top three grades, with higher brightness values than in the preceding two years. Dominant wavelengths remain about the same. Despite the low overall protein content of this year's crop, cooking quality for the No. 1 and No. 2 CW grades is acceptable with CQP values similar to last year's but lower than in 1990. It is interesting to note that in the mid-1980's, lower CQP values were evident - even though mean protein levels were substantially higher than in 1992. This suggests that newer registered varieties such as Kyle, which is again the predominant variety grown, have superior protein quality than previous varieties - allowing production of spaghetti of acceptable cooking quality from semolina of lower protein content.

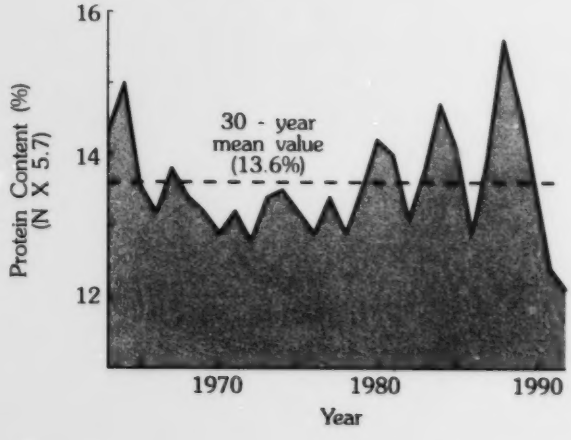
Quality data for the grade composite samples are provided in Tables 9 and 10.

8. Protein Content of 1992 Harvest Survey Canada Western Amber Durum Wheat

	Protein Content (%)*		
	Western Canada		
Grade	1992	1991	1982-91
No. 1 CWAD	12.8	12.7	14.1
No. 2 CWAD	12.2	12.2	13.9

* N x 5.7; 13.5% moisture content basis.

Figure 4. Mean Protein Content of Harvest Survey Western Canadian Amber Durum Wheat 1963 to 1992



9. NO. 1 AND NO. 2 CANADA WESTERN AMBER DURUM WHEAT
Quality Data for 1992 Harvest Survey Grade Composite Samples

Quality Parameter	1992		1991	
	No. 1 CWAD	No. 2 CWAD	No. 1 CWAD	No. 2 CWAD
WHEAT				
Test Weight, kg/hL	80.1	79.3	81.9	81.0
Weight per 1000 Kernels, g	44.8	43.1	42.1	41.2
Vitreous Kernels, %	92	77	85	77
Protein Content, % (13.5% moisture basis)	13.0	12.2	12.6	12.3
Protein Content, % (dry matter basis)	15.0	14.1	14.6	14.2
Ash Content, %	1.42	1.53	1.62	1.65
Yellow Pigment Content, ppm	8.4	8.3	N/A	N/A
SDS Sedimentation, mL	36	32	32	32
Alpha-amylase Activity, units/g	18.5	35.0	4.5	7.5
Falling Number, s	380	350	420	395
Particle Size Index, %	33.3	33.9	N/A	N/A
Milling Yield, %	73.5	73.3	74.5	73.7
Semolina Yield, %	63.7	62.8	65.5	64.4
SEMOLINA				
Protein Content, %	12.2	11.6	11.8	11.5
Wet Gluten Content, %	33.3	32.1	32.5	31.5
Ash Content, %	0.65	0.66	0.69	0.71
Yellow Pigment Content, ppm	7.5	7.4	N/A	N/A
AGTRON Color, %	77	78	77	79
Speck Count per 50 cm^2	42	46	33	34
Alpha-amylase Activity, units/g	7.0	8.0	0.9	2.4
Falling Number, s	420	410	N/A	N/A
SPAGHETTI				
Dried at 70°C				
Color:				
Brightness, %	53.0	52.9	51.5	51.6
Purity, %	47.3	46.5	49.8	49.7
Dominant Wavelength, nm	576.5	576.6	576.7	576.6
Cooking Quality, CQP	37	38	46	39
Cooking Loss, %	5.3	5.5	5.5	5.7

10. NO. 3 AND NO. 4 CANADA WESTERN AMBER DURUM WHEAT
Quality Data for 1992 Harvest Survey Grade Composite Samples

Quality Parameter	No. 3 CWAD	No. 4 CWAD
WHEAT		
Test Weight, kg/hL	79.6	77.5
Weight per 1000 Kernels, g	44.4	41.7
Vitreous Kernels, %	79	78
Protein Content, % (13.5% moisture basis)	11.9	11.4
Protein Content, % (dry matter basis)	13.8	13.2
Ash Content, %	1.55	1.56
Yellow Pigment Content, ppm	8.2	8.4
SDS Sedimentation, mL	31	30
Alpha-amylase Activity, units/g	28.0	37.5
Falling Number, s	315	300
Particle Size Index, %	33.0	32.3
Milling Yield, %	73.0	71.4
Semolina Yield, %	61.9	60.4
SEMOLINA		
Protein Content, %	11.0	10.3
Wet Gluten Content, %	29.5	25.3
Ash Content, %	0.65	0.67
Yellow Pigment Content, ppm	7.1	7.1
AGTRON Color, %	74	64
Speck Count per 50 cm^2	53	80
Alpha-amylase Activity, units/g	13.0	16.0
Falling Number, s	405	380
SPAGHETTI		
Dried at 70°C		
Color:		
Brightness, %	51.7	48.9
Purity, %	49.4	47.8
Dominant Wavelength, nm	576.7	577.3
Cooking Quality, CQP	33	27
Cooking Loss, %	5.6	5.8

Canada Western Red Winter Wheat

Canada Western Red Winter (CWRW) wheat has excellent milling quality. Flour produced from high grade CWRW wheat performs well in the production of hearth breads and certain types of noodles, and is also suitable for the production of various types of flat bread, steamed bread and related products. The variety Norstar continues to account for the major portion of the area seeded to CWRW wheat.

As indicated in Table 11, the average protein content for the No. 1 CW grade is 11.8% this year, 0.7 percentage units higher than in 1991. The No. 2 CW grade, at 11.1% protein, is 0.8 percentage units higher than last year.

Quality data for composites representing the top two grades, as well as comparative data from 1991, are provided in Table 12. Test weight and thousand kernel weight for both grades are similar to corresponding 1991 values. Relatively low wheat and flour alpha-amylase activity is exhibited and, as expected, higher wheat falling number and flour amylograph peak viscosity are given by the top grade.

Both grades exhibit the excellent milling properties characteristic of CWRW wheat. Flour yield is similar to 1991, while flour ash content is lower. Physical dough tests indicate stronger dough properties this year. Baking performance is also superior. This can be attributed mainly to the higher protein content in 1992.

11. Protein Content of 1992 Harvest Survey Canada Western Red Winter Wheat

	Protein Content (%)*	
Grade	1992	1991
No. 1 CWRW	11.8	11.1
No. 2 CWRW	11.1	10.3

* N x 5.7; 13.5% moisture content basis.

12. CANADA WESTERN RED WINTER WHEAT
Quality Data for 1992 Harvest Survey Grade Composite Samples

Quality Parameter	1992		1991	
	No. 1 CWRW	No. 2 CWRW	No. 1 CWRW	No. 2 CWRW
WHEAT				
Test Weight, kg/hL	82.8	81.0	82.1	81.4
Weight per 1000 Kernels, g	32.7	31.0	32.0	32.4
Protein Content, % (13.5% moisture basis)	11.7	11.4	11.2	10.3
Protein Content, % (dry matter basis)	13.5	13.2	12.9	11.9
Ash Content, %	1.45	1.40	1.39	1.53
Alpha-amylase Activity, units/g	15.0	18.5	6.3	13.2
Falling Number, s	325	300	375	320
Particle Size Index, %	54.4	56.9	54.0	55.0
Flour Yield, %	76.6	76.0	76.5	76.7
FLOUR				
Protein Content, %	10.8	10.5	10.5	9.5
Wet Gluten Content, %	33.6	30.8	29.9	27.7
Ash Content, %	0.40	0.42	0.44	0.44
Grade Color, K-J units	-1.8	-1.6	-1.4	-1.7
AGTRON Color, %	72	71	N/A	N/A
Starch Damage, Farrand units	27	25	26	25
Starch Damage, AACC units	7.7	7.7	N/A	N/A
Alpha-amylase Activity, units/g	4.0	6.0	4.0	9.0
Amylograph Peak Viscosity, BU	315	215	410	225
Maltose Value, g/100 g	2.0	2.1	2.1	2.2
FARINOGRAM				
Absorption, %	58.9	57.0	58.0	55.6
Development Time, min	5.50	5.00	5.00	5.00
Mixing Tolerance Index, BU	50	50	60	50
Stability, min	8.00	8.50	7.50	7.00
EXTENSIGRAM				
Length, cm	22	22	23	22
Height at 5 cm, BU	290	295	280	250
Maximum Height, BU	525	520	480	395
Area, cm^2	155	150	145	115
ALVEOGRAM				
Length, mm	193	166	177	161
P (height x 1.1), mm	62	58	57	54
W, x 10^3 ergs	340	288	284	252
BAKING (Remix-to-Peak Method)				
Absorption, %	59	57	58	56
Remix Time, min	2.6	2.2	2.3	1.9
Loaf Volume, cm^3	750	750	730	670

Canada Prairie Spring Wheat

The Canada Prairie Spring (CPS) class is divided into two categories: CPS-Red (CPS-R) which includes red-seeded varieties, and CPS-White (CPS-W) which includes the white-seeded variety Genesis. Two grades are available for each CPS type. The predominant variety for CPS-R is Biggar. Both Biggar and Genesis first became available for commercial production in 1989. This is the second year that harvest survey quality testing information is being published for these wheats.

Wheat of the CPS-R type is suitable for the production of hearth breads and can also be used alone or in blends for the production of noodles, flat breads, pan breads, crackers and related products. Canada Prairie Spring - White wheat is suitable for various types of noodles and flat breads, as well as for chapattis and crackers.

Quality data for the No. 1 grade composites, both red and white, are given in Table 13. Protein content of CPS-R is 10.7% and of CPS-W is 10.4%. These values are lower than last year and lower than the normally expected range of 11.5 to 12.0% for this class of wheat. Test weight for both the red and white composites is similar to last year, while thousand kernel weight is much higher.

Milling quality of both the red and white CPS types is superior this year - with the improvement primarily associated with lower flour ash content. The No. 1 CPS-R composite again shows weaker dough properties and poorer baking quality than expected, mainly due to lower protein content. Physical dough properties of the CPS-W flour are typical of this class of wheat.

13. CANADA PRAIRIE SPRING WHEAT
Quality Data for 1992 Harvest Survey Grade Composite Samples

Quality Parameter	No. 1 CPS - Red		No. 1 CPS - White	
	1992	1991	1992	1991
WHEAT				
Test Weight, kg/hL	79.7	79.7	80.8	80.9
Weight per 1000 Kernels, g	38.7	32.6	40.0	33.4
Protein Content, % (13.5% moisture basis)	10.8	11.2	10.8	10.8
Protein Content, % (dry matter basis)	12.5	12.9	12.5	12.5
Ash Content, %	1.41	1.55	1.34	1.59
Alpha-amylase Activity, units/g	4.0	1.5	11.5	3.5
Falling Number, s	385	390	345	405
Particle Size Index, %	55.1	53.8	57.0	57.2
Flour Yield, %	74.3	74.6	75.0	75.4
FLOUR				
Protein Content, %	10.1	10.4	9.9	10.0
Wet Gluten Content, %	29.4	31.3	30.4	30.7
Ash Content, %	0.48	0.54	0.43	0.49
Grade Color, K-J units	-1.2	-0.3	-1.1	-1.2
AGTRON Color, %	69	N/A	72	N/A
Starch Damage, Farrand units	26	24	21	21
Starch Damage, AACC units	8.0	N/A	7.4	N/A
Alpha-amylase Activity, units/g	2.0	0.5	4.0	1.5
Amylograph Peak Viscosity, BU	565	805	495	740
Maltose Value, g/100 g	1.8	1.6	1.7	1.6
FARINOGRAM				
Absorption, %	58.2	57.9	60.0	58.8
Development Time, min	4.25	3.25	3.50	2.75
Mixing Tolerance Index, BU	65	60	65	80
Stability, min	6.00	5.50	5.50	3.50
EXTENSIGRAM				
Length, cm	25	25	22	23
Height at 5 cm, BU	240	215	250	200
Maximum Height, BU	360	320	355	270
Area, cm^2	125	110	110	90
ALVEOGRAM				
Length, mm	171	182	132	160
P (height x 1.1), mm	53	50	67	56
W, x 10^3 ergs	226	205	218	183
BAKING (Remix-to-Peak Method)				
Absorption, %	57	57	58	57
Remix Time, min	1.5	1.0	1.1	0.9
Loaf Volume, cm^3	665	685	590	610

Canada Western Utility Wheat

Canada Western Utility (CWU) wheat is characterized by its hard kernel texture and very strong physical dough properties. This wheat is normally excellent for blending purposes and can also be used for the production of pan breads, hearth breads and related products where extra strong dough properties are desirable.

Protein content for this year's CWU wheat averaged 11.8%, which is 1.1 percentage units lower than last year. The predominant variety for this class is, once again, Glenlea.

Quality data for the 1992 No. 1 CWU grade composite are shown in Table 14. While test weight and thousand kernel weight values are similar to those obtained last year, wheat falling number and flour amylogragh peak viscosity values are somewhat lower. Milling quality is superior to last year in that both flour ash content and flour color are better. The high flour starch damage is consistent with the hard kernel texture of CWU wheat.

Due to very strong properties, dough made from CWU wheat flour cannot be properly developed at the normal farinogragh speed of 63 rpm. When operated at 90 rpm, the farinograph test showed dough consistency maxima at 1.50 and 6.75 minutes. Remix-to-peak test baking results show the very good bread quality for the protein content when sufficient mixing and fermentation is imparted to obtain optimum dough development.

14. NO. 1 CANADA WESTERN UTILITY WHEAT
Quality Data for 1992 Harvest Survey Grade Composite Samples

Quality Parameter	1992	1991
WHEAT		
Test Weight, kg/hL	78.7	78.5
Weight per 1000 Kernels, g	40.0	38.5
Protein Content, % (13.5% moisture basis)	11.6	12.8
Protein Content, % (dry matter basis)	13.4	14.8
Ash Content, %	1.53	1.71
Alpha-amylase Activity, units/g	13.5	4.7
Falling Number, s	365	390
Particle Size Index, %	44.5	43.9
Flour Yield, %	75.8	75.8
FLOUR		
Protein Content, %	10.8	12.1
Wet Gluten Content, %	31.0	31.7
Ash Content, %	0.51	0.58
Grade Color, K-J units	-1.3	-0.2
AGTRON Color, %	70	N/A
Starch Damage, Farrand units	40	45
Starch Damage, AACC units	10.6	N/A
Alpha-amylase Activity, units/g	4.0	1.0
Amylograph Peak Viscosity, BU	440	615
Maltose Value, g/100 g	2.7	2.8
FARINOGRAM		
Absorption, %	60.9	61.6
Development Time (90 rpm), min	6.75	8.50
EXTENSIGRAM		
Length, cm	26	25
Height at 5 cm, BU	340	345
Maximum Height, BU	640	685
Area, cm^2	230	235
ALVEOGRAM		
Length, mm	80	96
P (height x 1.1), mm	109	120
W, x 10^3 ergs	360	448
BAKING (Remix-to-Peak Method)		
Absorption, %	61	63
Remix Time, min	3.6	3.8
Loaf Volume, cm^3	850	880

Canada Western Soft White Spring Wheat

Canada Western Soft White Spring (CWSWS) wheat is a lower protein, soft wheat with weak dough properties. Flours milled from this wheat are suitable for the production of cookies, cakes, biscuits and related products. They can also be used alone or in blends with stronger wheat flours for the production of crackers, flat breads, steamed breads and certain types of noodles.

Wheat of this class is grown under irrigation to maximize yield and minimize protein content. Mean overall protein content for 1992 is 10.6%, the same as last year. Table 15 outlines protein content of the top two grades for a three-year period. The predominant variety grown was again Fielder.

Quality data for the two composites and comparative results for 1991 are provided in Table 16. Values for test weight are lower than in 1991 while values for thousand kernel weight are higher. Wheat falling number and flour amylograph peak viscosity values are generally lower than last year. Milling yield is higher this year, as are flour ash content and flour color. Farinograph and alveograph properties indicate that the 1992 flours have dough properties similar to those of 1991.

15. Protein Content of 1992 Harvest Survey Canada Western Soft White Spring Wheat

	Protein Content (%)*		
Grade	1992	1991	1990
No. 1 CWSWS	10.3	10.6	10.8
No. 2 CWSWS	10.9	10.7	11.1

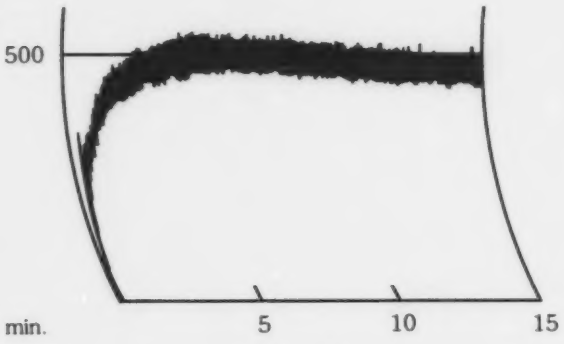
* N x 5.7; 13.5% moisture content basis.

16. CANADA WESTERN SOFT WHITE SPRING WHEAT
Quality Data for 1992 Harvest Survey Grade Composite Samples

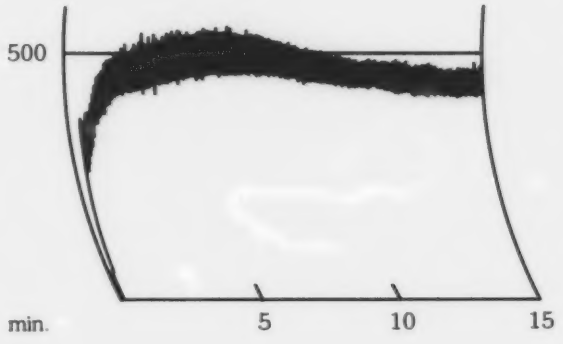
Quality Parameter	1992		1991	
	No. 1 CWSWS	No. 2 CWSWS	No. 1 CWSWS	No. 2 CWSWS
WHEAT				
Test Weight, kg/hL	79.0	76.8	81.0	80.1
Weight per 1000 Kernels, g	37.3	35.2	35.4	34.6
Protein Content, % (13.5% moisture basis)	10.4	10.7	10.8	10.8
Protein Content, % (dry matter basis)	12.0	12.4	12.5	12.5
Ash Content, %	1.61	1.58	1.55	1.58
Alpha-amylase Activity, units/g	18.0	52.5	12.6	17.5
Falling Number, s	310	235	310	285
Particle Size Index, %	66.0	67.2	67.6	65.9
Flour Yield, %	75.7	74.7	73.4	72.6
FLOUR				
Protein Content, %	9.4	9.7	9.3	9.4
Wet Gluten Content, %	32.1	32.7	32.2	33.6
Ash Content, %	0.52	0.51	0.46	0.45
Grade Color, K-J units	0.9	1.2	0.0	0.0
AGTRON Color, %	57	54	N/A	N/A
Starch Damage, Farrand units	9	8	11	9
Starch Damage, AACC units	5.1	4.9	N/A	N/A
Alpha-amylase Activity, units/g	7.0	25.5	4.0	6.0
Amylograph Peak Viscosity, BU	340	140	665	470
Maltose Value, g/100 g	1.5	1.7	1.2	1.2
AWRC, %	74.5	73.0	77.8	79.0
FARINOGRAM				
Absorption, %	55.1	55.2	54.8	55.0
Development Time, min	1.25	1.25	1.25	1.25
Mixing Tolerance Index, BU	195	210	1[illegible]5	190
Stability, min	1.50	1.50	1.50	1.00
ALVEOGRAM				
Length, mm	80	89	97	117
P (height x 1.1), mm	23	22	24	23
W, x 10^3 ergs	43	41	37	44
COOKIE TEST				
Spread, mm	79.5	80.4	81.8	80.9
Ratio (spread/thickness)	8.0	8.0	9.0	8.1

Figure 5. Farinograms of 1992 Crop Composite Samples

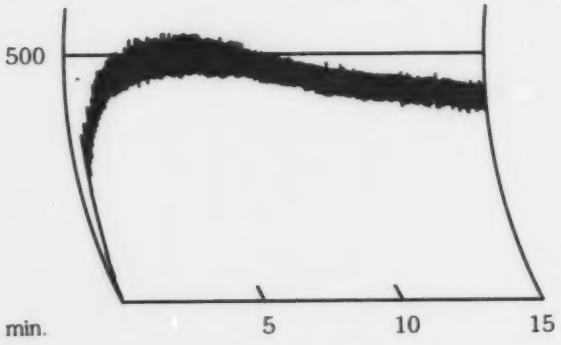
No. 1 Canada Western 13.5 Red Spring Wheat



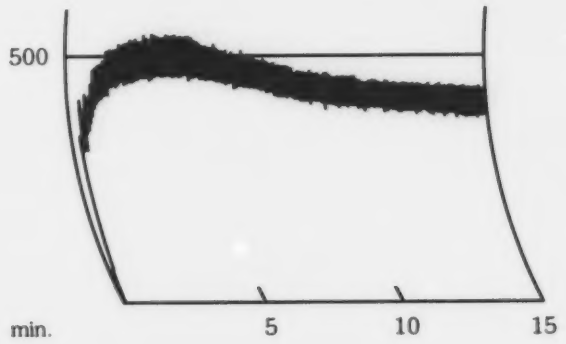
No. 1 Canada Western Red Winter Wheat



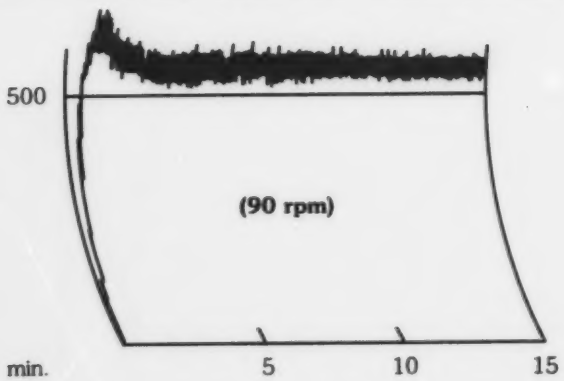
No. 1 Canada Prairie Spring Wheat - Red



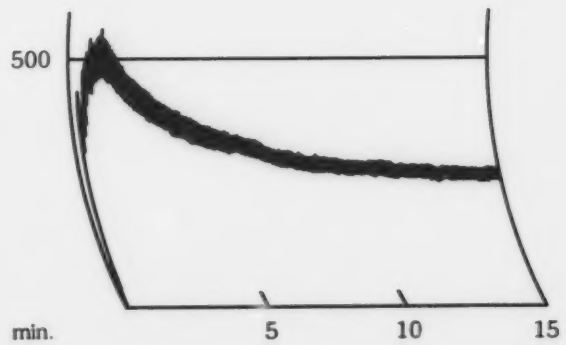
No. 1 Canada Prairie Spring Wheat - White



No. 1 Canada Western Utility Wheat



No. 1 Canada Western Soft White Spring Wheat



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Methods

Notes on the methods used at the Grain Research Laboratory are given below. Unless otherwise specified, analytical results for wheat are reported on a 13.5% moisture basis and for flour on a 14.0% moisture basis. The AACC methods cited are those of the American Association of Cereal Chemists given in *Cereal Laboratory Methods*, Eighth Edition, 1983. The ICC methods are those of the International Association for Cereal Science and Technology.

Test Weight is determined using the Schopper Chondrometer equipped with the 1 litre container. The weight in grams of the measured litre of wheat is divided by 10 and the result is reported on an "as is" moisture content basis.

Weight per Thousand Kernels. Broken kernels and foreign material are first removed from a sample by hand-picking. The number of kernels in a 20 g sub-sample of this cleaned material is then counted using an electronic seed counter.

Protein Content (N x 5.7) of the composite samples is determined by the Kjeldahl method as modified by Williams, "Journal of the Science of Food and Agriculture" 24:343, 1973. Near-infrared transmission (NIT) spectroscopy is used for the protein survey samples.

Yellow Pigment Content of durum wheat and semolina is determined using AACC Method 14-50.

Alpha-amylase Activity of wheat and of flour is determined by the method of Kruger and Tipples, "Cereal Chemistry" 58:271-274, 1981.

Falling Number is determined on a 7 g sample of ground wheat by the method of Hagberg, "Cereal Chemistry" 38:202-203, 1961. Wheat (300 g) is ground in a Falling Number Laboratory Mill 3100 (ICC Standard Method No. 107). Results are reported on a 14.0% moisture content basis.

Particle Size Index (PSI) is determined according to Williams and Sobering, "Cereal Foods World" 31:417-420, 1986. PSI is an indication of the relative kernel texture (hardness or softness) of different wheat types. Soft wheats give high PSI values of 65 to 75; durum wheats give low values of 35 to 45; and all other wheat types give intermediate values.

Milling (flour). Wheat is cleaned, scoured and tempered overnight to optimum moisture as described by Dexter and Tipples, "Milling" 180(7):16, 1987. Milling of common wheat is then carried out in an Allis-Chalmers laboratory mill using the GRL sifter flow as described by Black *et al*, "Cereal Foods World" 25:757-760, 1980. Flour yield is expressed as a percentage of cleaned wheat on a constant moisture basis, and for CWRS wheat, is also expressed on a constant ash content basis computed as described by Dexter and Tipples, "Milling" 182(8):9-11, 1989. Pilot milling (flour) is carried out as described by Black, "Bulletin - Association of Operative Millers", 3834, 1980.

Wet Gluten Content. The ICC Standard Method No. 137 is followed using the "Glutomatic" System.

Ash Content is determined on a 4 g sample in a silica dish incinerated overnight at 600°C. After cooling, the dish plus ash are weighed, the ash brushed out, the dish reweighed, and the weight of ash determined by difference.

Grade Color. A color index is obtained using the automated Simon Series IV Flour Color Grader which gives the relative reflectance of a flour-water slurry. Results are reported as arbitrary scale units; the lower the number, the brighter the color.

AGTRON Color of flour and durum wheat semolina is determined using AACC Method 14-30. An AGTRON direct reading reflectance spectrophotometer is used.

Starch Damage (Farrand) is determined on a 5 g sample by the method of Farrand, "Cereal Chemistry" 41:98-111, 1964.

Starch Damage (AACC) is determined using AACC Method 76-30A.

Amylogram. Sixty-five grams of flour (14.0% moisture content basis) and 450 mL distilled water are used with the Brabender Amylograph and the pin stirrer; other details are as in AACC Method 22-10. Peak viscosity is reported in Brabender units.

Maltose Value is determined according to AACC Method 22-16.

Alkaline Water Retention Capacity (AWRC) is determined using AACC Method 56-10.

Farinogram. Fifty grams of flour (14.0% moisture content basis) are mixed in a small stainless steel farinograph bowl (63 r.p.m. drive) for 15 min. with

sufficient distilled water to give a maximum dough consistency centered about the 500 Brabender Unit line. Farinograph absortpion is the amount of water which must be added to a flour of 14.0% moisture content to give the required consistency, and is reported as percent. Dough development time is the time required for the curve to reach its maximum height. For additional details, see the *Farinograph Handbook*, AACC, 1960.

Extensigram. Doughs are made from 300 g flour (14.0% moisture content basis), 6 g salt, and distilled water equal to the farinograph absorption less 2.0 percentage units to compensate both for the salt and for the substitution of the large stainless steel farinograph bowl. Doughs are mixed for 1 min., rested for 5 min., and mixing is then continued until the curve is centered about the 500 Brabender Unit line. Curves are drawn for duplicate doughs at 45 and at 135 min. though doughs are also rounded and shaped at 90 min. Average curves for 45 and 135 min. are obtained, but measurements (length in centimeters, height in Brabender Units, and area in square centimeters) are reported only for the 135 min. curve. The Extensigraph is set so that 100 Brabender Units equal a 100 g load.

Alveogram. The ICC Standard Method No. 121 is followed, using the constant pressure Model MA82 instrument.

Remix-to-Peak Baking Test is a modification of the Remix baking test procedure of Irvine and McMullan, "Cereal Chemistry" 37:603-613, 1960, as described in detail by Kilborn and Tipples, "Cereal Foods World" 26:624-628, 1981. Dough is mixed to optimum (peak) consistency at the second mixing stage.

Sponge-and-Dough Baking Test. This method is based on a 4.5 hr. 70% sponge system as described by Kilborn and Preston, "Cereal Chemistry" 58:198-201, 1981.

Canadian Short Process Baking Test is carried out as described by Preston *et al*, "Canadian Instituite of Food Science and Technology Journal" 15:29-36, 1982. For this method and for the sponge-and-dough procedure, loaves are produced from 200 g of flour in baking pans that have cross-section dimensions similar to those of Canadian commercial baking pans. Preliminary baking tests are carried out to determine optimum oxidation requirements.

Cookie Test is performed according to AACC Method 10-50 D.

Vitreous Kernels. This determination is made by the Grain Inspection Division on a 25 g sample of clean wheat. The vitreous kernels are handpicked and weighed.

SDS Sedimentation values are determined by the method of Axford and Redman, "Cereal Chemistry" 56:582 (1979), using 3% SDS.

Milling (semolina). Wheat is cleaned, scoured and tempered overnight to optimum moisture as described by Dexter and Tipples, "Milling" 180(7):16, 1987. An Allis-Chalmers mill in conjunction with a laboratory purifier (Black, "Cereal Science Today" 11:533, 1966) is used for milling as described by Dexter *et al*, "Cereal Chemistry" 67:405, 1990. Milling yield (including flour) and semolina yield (less than 1% through a 149 micron sieve) are reported, on a constant moisture basis, as a percentage of the cleaned wheat. The millroom environment is controlled for temperature (22°C) and humidity (60%).

Speck Count is determined as described by Dexter and Matsuo, "Cereal Chemistry" 59:63 (1982).

Spaghetti is processed from semolina on a DEMACO laboratory-scale continuous extrusion press as described by Matsuo *et al* "Cereal Chemistry" 55:744 (1978) and dried using a high-temperature cycle (70°C) as described by Dexter *et al* "Journal of Food Science" 46:1741 (1981).

Spaghetti Color. Whole strands of spaghetti are mounted on white cardboard for color measurements. Dominant wavelength, purity and brightness are determined, using the Ten Selected Ordinates method, with a Beckman DU-7 Spectrophotometer.

Spaghetti Cooking Quality is determined according to the method of Dexter and Matsuo, "Canadian Journal of Plant Science" 57:717-727, 1977.

Cooking Loss, the amount of material lost in the cooking water, is determined as described by Matsuo *et al*, "Cereal Chemistry" 69:27-29, 1992.

Collection of Samples. Samples are obtained from producers and from grain companies operating primary elevators in Western Canada. Samples collected up to and including the following dates were used for 1992:

September 25	No. 1 and No. 2 CW Red Winter Wheat
October 2	No. 1 CW Red Spring Wheat
October 7	No. 1 and No. 2 CW Amber Durum Wheat
October 16	No. 1 CW Soft White Spring Wheat
October 19	No. 3 and No. 4 CW Amber Durum Wheat
October 20	No. 2 CW Red Spring Wheat
October 23	No. 3 CW Red Spring Wheat
October 26	No. 1 CW Utility Wheat
October 27	No. 1 Canada Prairie Spring Wheat (Red and White) No. 2 CW Soft White Spring Wheat

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